

Session 9: Post class test solutions

1. **b. 1.50:** First, unlever the average beta in the sector, using the average debt to equity ratio. Second, correct for the cash holdings of firms in the sector.
 - $\text{Unlevered beta} = 1.38 / (1 + (1-.4)(.25)) = 1.20$
 - $\text{Unlevered beta of business} = 1.20 / (1-.2) = 1.50$
2. **c. 1.33.** First, estimate the values of the two businesses, using the revenues from each business and the EV/Sales averages for the sectors. Then, use these values to get weights for the businesses and an unlevered beta for the company.

	Unlevered Beta	EV/Sales	Revenues	Estimated value	Weights
Food	0.8	1.25	100	125	0.625
Chemicals	1.2	1.5	50	75	0.375
Company	0.95			200	

$$\text{Levered beta} = 0.95 (1 + (1-.4) (.6667)) = 1.33$$

3. **c. 0.85.** The current beta (which is also the unlevered beta, because the firm has no debt) is a weighted average of the betas of the two businesses the firm is in:
 $\text{Beta of movies} (2/3) + 1.00 (1/3) = 0.90$
 $\text{Beta of movies} = (0.90 - (1/3)) / (2/3) = 0.85$
4. **e. None of the above.** The unlevered beta for the company after the expansion will be a weighted average of two businesses, its current business with a value of \$50 million and an unlevered beta of 0.75 and its new business with a value of \$25 million and an unlevered beta of 1.20:
 $\text{Unlevered beta} = 0.75 (50/75) + 1.20 (25/75) = 0.90$
 The debt to equity ratio after the transaction will be 50.00% (\$25 million in new debt on top of \$50 million in existing equity).
 $\text{Levered beta} = 0.90 (1 + (1-.4) (25/50)) = 1.17$
5. **d. 1.512.** The first step is to estimate the unlevered beta of the business that the company currently is in. To do this, you first unlever the beta:
 $\text{Unlevered beta of company} = 1.17 / (1 + (1-.40) (50/100)) = 0.90$
 Then, you take out the effect of cash (\$25 million out of firm value of \$150 million).
 $\text{Unlevered beta of business} = 0.90 / (1 - 25/150) = 1.08$
 After the cash is used to buy back stock, the value of equity will go down to \$75 and the debt to equity ratio will rise to 66.67% (50/75):
 $\text{Levered beta} = 1.08 (1 + (1-.4) (50/75)) = 1.512$